

BLIND MOUNT, CAUSES AND RELATION TO
CERTAIN SOCIAL FACTORS

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AMERICAN FOUNDATION
FOR THE BLIND INC.

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BULLETIN 10

BLINDNESS - AMOUNT, CAUSES AND RELATION TO
CERTAIN SOCIAL FACTORS



Division of Public Health Methods
NATIONAL INSTITUTE OF HEALTH
The United States Public Health Service
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The data presented herewith are from the National Health Survey, a project conducted by the United States Public Health Service with the aid of financial grants from the Works Progress Administration. As described in the first release of this series, these reports are based on a house-to-house canvass of some 800,000 families including 2,800,000 persons in 83 cities and 23 rural areas in 19 states. The survey was made during the winter (largely from November to March) of 1935-36. The total surveyed population was so distributed as to give a sample which was, in general, representative of cities in the United States according to size and region. In large cities (100,000 and over) the population to be canvassed was determined by a random selection of many small districts based on those used in the U. S. Decennial Census of 1930. In the smaller cities selected for study the population was enumerated completely.

Data obtained from the families surveyed include:

I. Composition and characteristics of the population: age, sex, color, marital condition, nativity, usual occupation, employment status, family income and relief status, rent, number of rooms in the house, and sanitary facilities.

II. Several measures of illness for each person: (a) illness keeping a person from work, school, or other usual activity on the day of the canvass; (b) illness which had disabled a person in the above sense continuously for seven days or more during the 12 months preceding the date of the canvass; (c) chronic disease present, whether or not it had caused disability; (d) gross physical impairment, including lost and impaired legs, feet, arms, fingers, etc., and total or partial blindness and deafness.

III. Certain facts about the kind and amount of medical care: number of calls by doctors, days spent in hospital, days of private duty nursing, and the number of calls by a visiting nurse.

This project was carried out under the general direction of Dr. L. R. Thompson, Director, National Institute of Health, George St. J. Perrott, Project Director, and Clark Tibbitts, Field Director. Others responsible for the technical aspects of the study were Selwyn D. Collins, Principal Statistician, and Rollo H. Britten, Senior Statistician.

The major part of the responsibility for the preparation of this bulletin was assumed by Mr. Kenneth W. Revell of the survey staff.

BLINDNESS - AMOUNT, CAUSES AND RELATION TO CERTAIN SOCIAL FACTORS

It has always been the practice of the American public to lend a helping hand to the blind person at a traffic intersection or to buy a pencil from a sightless individual. However, because of the economic loss due to unproductivity and the financial assistance to the individual and his family so often necessary, the problem of caring for the blind is not one purely of compassion--it is increasingly one of state and national importance. Within their budget limitations, public and private agencies have long been engaged in activities concerned with financial aid and occupational training for the blind. Recently an expansion of these activities has become possible under the Federal Social Security Act and since February 1936 supplementary assistance has been given to individual States cooperating with the Social Security Board. The fact that the blind are not usually found in public places makes it difficult for persons to realize how many there are. However, that the blind do constitute a major problem in society is indicated in this bulletin; that the magnitude of this problem will increase is inherent in the fact of the increasing proportion of persons in the higher age groups, those groups with the greatest prevalence of blindness.

The following discussion will deal primarily with persons reported by the family as being blind in both eyes¹, will but briefly consider those who have lost or are blind in one eye, and cannot in any manner include the far greater number who are in the various stages of diminishing sight.

ESTIMATE

From National Health Survey data it is estimated that there are 107,000* blind persons in the general population of the United States. That figure must be considered as a minimum because of the recognized incompleteness of house-to-house canvasses. Furthermore, an estimate of the total number of the blind should include the 10,000² or more in schools and industrial establishments provided for the blind by both public and private agencies.** The cases found by the enumerators form a ratio of 82 blind persons to each 100,000 of the general population. If the estimated number in institutions were added, this ratio would be increased to about 90 for every 100,000 persons, and the estimated number of blind in the United States to about 117,000. This estimate must be regarded as a minimum.

To those familiar with other published data--particularly the most recent Census Bureau report--this estimate may seem high. The bureau enumerated 63,489 blind persons in the United States in 1930. The Census publication admits understatement³ due to several factors, such as method of enumeration, lack of exact definition to cover complexities of the situation, reluctance of the informant to report cases of blindness in the family, and in some cases failure by the enumerator to ask the question. Other sources indicate to some extent the degree of the under-enumeration; two examples are cited:

1. During the summer of 1930, the blind in a small Connecticut area were enumerated, one purpose being a comparison of results with those of the federal census. After thorough search it was found that, not only was this special enumeration incomplete, but the Census Bureau had enumerated only 49 percent of the blind in that area.⁴
2. In the 1930 Census Bureau report 626 blind persons were recorded for the State of Maine; yet in this State there were 1,268 persons receiving aid to the blind in April 1938, and it would not seem likely that all of the excess could be accounted for by difference in definition or by a real increase in the number of blind persons.

* Exclusive of individuals in institutions for the care or rehabilitation of persons with impairment or disease.

** In addition to this group there are an undetermined number of blind persons in mental hospitals, homes for the aged, etc.

It is probable that Best made a closer approximation in his 1934 publication.⁵ He says, "the total number of the blind in the United States ranges from 95,000 to 105,000--or in round numbers about 100,000". A wide variation in the rate per 100,000 population is observed in the figures from these different sources:

Source	Rate per 100,000 population
Census Bureau: 1930	52
Best: 1934	80
Health Survey: 1935-36	90*

Although the rate is not to be regarded as an estimate of the prevalence of blindness, it is interesting to note that the Social Security Board served 43 blind persons per 100,000 population in July 1938.⁶ The individual State ratios ranged from 146 per 100,000 population in Maine to 12 in Michigan, the variation being due to several factors, including, (a) partial coverage because of short period of operation, (b) difference between states in interpretation of need, (c) difference between states as to whether a needy blind person, 65 years of age or over, is given old age assistance or assistance for the blind.

CAUSES OF BLINDNESS

There are many diseases which affect one or more of the parts of the eye, such as cataract, glaucoma, trachoma and atrophy of the optic nerve. The eye is not only subject to such affections but is peculiarly responsive to systemic disorders, such as diseases of the nervous and the circulatory systems.

TABLE 1.—Percentage Distribution of Blindness, Both Eyes, According to Cause

2,053 Cases^a Among 2,502,391 Persons in 83 Cities National Health Survey, 1935-36

Cause of blindness	Percentage distribution
All causes	100.0
Diseases	72.1
Known	
Cataract	19.3
Other diseases of the eye	11.9
Infectious and parasitic	5.6
Chronic	5.0
Cerebral hemorrhage	3.7
Ill defined	
Unknown ^b	14.8
Senility	8.2
Other ill defined	3.6
Accidents	20.6
Automobile ^b	2.1
Not automobile	
Occupational ^b	7.8
In the home ^b	5.0
In a public place ^b	3.3
Unspecified place ^b	2.4
Congenital and early infancy ^b	7.3

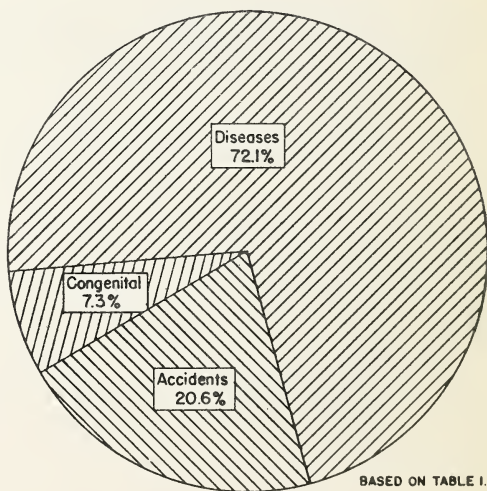


FIG. 1.—Percentage Distribution of Blindness, Both Eyes, according to Cause

^a Exclusive of individuals in institutions for the care or rehabilitation of persons with impairment or disease.

^b 20.6 percent of cases, reported to be of unknown cause, have been distributed proportionately among diseases, accidents, and congenital causes (the percentages added being 14.8 for diseases, 0.4 for automobile accidents, 1.6 for occupational accidents, 1.0 for home accidents, 0.7 for public place accidents, 0.6 for unspecified place accidents, and 1.6 for congenital causes).

Moreover, although the eye is tough in a muscular sense, its surface location makes it vulnerable to accident. These are the major reasons why the eye is more susceptible to the serious effects of the combined forces of disease and

* Inclusive of the estimated number of institutionalized cases.

injury than most other organs of the human body.

Disease. As shown in figure 1 and table 1, diseases caused about three-fourths of all blindness, both eyes, reported in the Health Survey. Cataract was the most frequent single cause of blindness, having been assigned as the cause of 19.3 percent of the cases. It is probable also that some of the cases for which "senility" was recorded as the cause were really due to cataract.

Because of the nature of the Survey it was to be expected that in only few of the cases of blindness would syphilis be given as the cause, although it is recognized that this disease often results in blindness. The cases with venereal disease as a cause are concealed within several of the items in table 1. In particular it is suspected that such cases make up a large part of the "unknown" group (20.5 percent). This supposition finds support in the smaller proportion of "unknown" causes among the cases of blindness in one eye (7.5 percent). It is generally acknowledged that when syphilis affects the vision the more likely result will be partial or complete blindness in both eyes.

Included under "other diseases of the eye" are cases of conjunctivitis, infected eye, glaucoma and trachoma reported in too few instances to be given separately. The more important of the general infectious and parasitic diseases were scarlet fever, measles, typhoid fever, and meningitis. Among the diseases included under the term "chronic" are, in the order of their frequency, diabetes, affections of the kidneys, nervous conditions, tumors of one type or another, chronic diseases of the nose and throat, and diseases of the female organs.

Accident.⁷ Accidents, considered as a group, accounted for one-fifth (20.6 percent) of the entire amount of blindness.

Of those cases of blindness caused by accidents for which place of occurrence was reported, 43 percent were caused by occupational accidents, 27 percent by accidents in the home, and 30 percent by those in public places, including automobile accidents.

TABLE 2.—Percentage Distribution of Blindness, Both Eyes, Caused by Accidents according to Means of Injury

423 Cases* Among 2,502,391 Persons in 83 Cities National Health Survey, 1935-36

Means of injury	Percentage distribution
All means of injury	100.0
Fall	15.7
Automobile	10.4
Burn	10.1
Poison	7.1
Firearms, other than wounds of war	7.1
Cutting and piercing instrument	5.3
Machinery, and injury in mine and quarry	3.9
Wounds of war	3.6
Excessive heat	1.8
Transportation other than automobile	1.8
Lightning and electric current	1.2
Animal	.9
Unspecified	31.1

* Exclusive of individuals in institutions for the care or rehabilitation of persons with impairment of disease; includes 66 cases reported to be of unknown cause which have been distributed proportionately according to means of injury (see footnote b, table 1).

The means of injury for the cases of blindness which were due to accidents is shown in table 2. Falls were responsible for the greatest number of cases, 23 percent of those known as to means. The actual impairment probably resulted from the puncturing of eyes by some sharp object, a blow on the head or severe shock from the fall. Automobile accidents, the second most frequent means of injury (15 percent of cases known as to means), present about the same possibilities plus the hazard of flying parts—particularly glass—from the impact. Burns, which are common in foundries, glass and chemical industries, and in the home, were

the third most frequent means of injury, with poison, firearms, and cutting and piercing instruments following.

THE AGE FACTOR

The average age of the blind was just over 60 years; of the general population, less than 30. Thus it is evident that there is a direct correlation between blindness and age. The concentration of the blind in the higher age groups is shown in table 3. It was found that more than one-fourth of all the blind were over 75 years old; three-fifths were over 55 and practically all were within or past the working ages (over 15 years). It must be remembered, though, that recovery from blindness is rare. Consequently, the larger percentage of blind in the older age groups is made up not only of those that become blind at that

age but also those who have become blind in all earlier periods of life.

The figures just given represent the relative magnitude of the problem of the blind in the different age groups; the proportion of persons who are blind at any given age is shown in the second column of table 3 and in figure 2. Among

TABLE 3.— *Percentage Distribution and Frequency Rate of Blindness, Both Eyes, according to age*

2,053 Cases^a Among 2,502,391 Persons in
83 Cities National Health Survey, 1935-36

Age in years	Percentage distribution	Rate per 100,000 population
All ages	100.0	82
Under 15	3.3	11
15 to 24	3.1	14
25 to 34	5.5	27
35 to 44	9.4	49
45 to 54	13.3	90
55 to 64	16.5	185
65 to 74	22.7	457
75 to 84	18.6	1093
85 and over	7.6	2916

^a Exclusive of individuals in institutions for the care or rehabilitation of persons with impairment or disease.

TABLE 4. *Annual Incidence of New Cases of Blindness according to Age*

Calculated from Table 3^a National Health Survey, 1935-36

Age	Annual incidence of new cases
All ages	6.6
Under 7½ years	1.5 ^b
7½ to 19	0.2
20 to 29	1.3
30 to 39	2.2
40 to 49	4.1
50 to 59	9.5
60 to 69	27.2
70 to 79	63.6
80 to 89	182.3

^a Exclusive of individuals in institutions for the care or rehabilitation of persons with impairment or disease.

^b Including congenital and hereditary.

children under 5 years of age the rate is 11 per 100,000. In each succeeding age group there is found a marked increase in the rate, which reaches the extreme figure of 2,916 for persons 85 or more years of age—about three percent.

Since few blind persons recover their sight, the curve in figure 2 may be

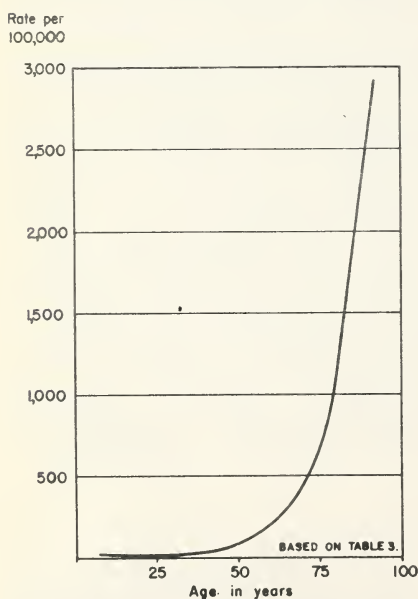


FIG. 2.— *Frequency Rate of Blindness, Both Eyes, per 100,000 Population according to Age*

taken as representing the accumulation of blind persons in the population throughout the span of life. If it be assumed that, over a period of years, there has been no material change in the prevalence of blindness at specific ages and that the mortality rate of the blind does not differ very greatly from that of the total population, an estimate can be made of the rate of development of new cases of blindness at specified ages. For instance, the prevalence rate of 49 in table 3 for the ages 35-44 would indicate that 49 persons in each 100,000 had become blind by the time they had reached about 40 years of age. Similarly the rate of 91 for the age group 45-54 would indicate that 91 per 100,000 had become blind by the time they reached 50 years of age. Then the difference between these two rates (41) gives the number per 100,000 who became blind between 40 and 50 years of age. The average annual frequency of new cases for this age group would be obtained by dividing the 41 by 10 (the number of years in the group). A similar calculation for each age group results in the series of figures presented in table 4.

This approximation yields an annual frequency of new cases of blindness of 6.6 per 100,000 persons. It will be seen that the rate of development of new cases increases rapidly with age.

The proportion of cases of blindness due to different causes varies with

age. The infant blind are primarily the victims of congenital and hereditary blindness. When the infant has learned to walk he is subject to accident, particularly by sharp instruments. Immediately thereafter the diseases of childhood, such as scarlet fever, measles and meningitis, cause most of the blindness. Cataract as a cause of blindness shows a definite upward trend with increasing age, accounting for 28 percent of the blindness among persons over 65. Accidents as a cause of blindness occur at every age, but there is a marked rise in their frequency during the working ages and a gradual decline thereafter. Senility, though perhaps a vague term when used in this connection, was given as a cause in 12 percent of the cases over 65 years of age.

BLINDNESS AS RELATED TO SEX

As was previously pointed out there are 82 blind persons for every 100,000 persons in the general population. These cases, however, are not equally divided as to sex. There are 86 blind males for every 100,000 males in the general population as compared with 78 female blind for every 100,000 females. Thus for each 100 female blind there are approximately 110 blind males. The excess is probably due to a number of factors, such as the larger percentage of male blindness resulting from accident while at work; syphilis, known to be more prevalent among males; wounds of war; and accidents causing blindness, other than those in industry, which find a predominance among males.

At the different age periods varying proportions of blindness among the two sexes are found, with the male rate considerably above the female rate for each age group except the oldest (where a slight excess in the female rate is found). The greatest excess in the male rate is for persons 15 to 24 years old where the male blind outnumber the female blind by more than two to one (see table 5).

BLINDNESS AMONG COLORED PERSONS

The rate of blindness per 100,000 colored population was 146 as compared with 75 for the white population (see table 5). The greater prevalence of syphilis is presumably one of the reasons for the higher rate of blindness in this group. The important causes of blindness among colored persons follow the same pattern as for the white with the exception that accidents show a higher rate, due probably to the larger proportion of colored persons in unskilled labor activities.

EMPLOYMENT STATUS

Eleven percent of the blind were reported as being employed. For the ages between 15 and 64 this percentage was 29 for blind males and 5 for the female blind. Some of the blind are employed in industrial establishments provided for them; some work in private industry but it is doubtful if many have earning power sufficient for them to be entirely independent. An indication of the economic condition of the blind is given in the following paragraphs on income.

INCOME

Physical impairments handicap the afflicted in varying degrees. In many cases the individual is able to adjust himself so that he can find gainful employment. However, sight is such an important faculty in most occupations that the greater number of jobs are entirely closed to the blind. Even in those avenues of employment left open, the blind are less capable of readjusting themselves. A loss of earning power is the consequence to society.

Some indication of the economic condition of the blind can be found in the annual income of the families of which they are a part. Sixty-eight percent of the blind were in families on relief or with an income of less than \$1000 per year, as compared with 45 percent of the general population.* Thus, if the

TABLE 5. - Frequency Rate per 100,000 Population of Blindness, Both Eyes, according to Sex, Age, Color and Annual Family Income
2,053 Cases^a Among 2,502,391 Persons in 83 Cities National Health Survey 1935-36

Color and annual family income	Age in years																	
	All ages	Under 15	15-24	25-44	45-64	65 and over	All ages	Under 15	15-24	25-44	45-64	65 and over	All ages	Under 15	15-24	25-44	45-64	65 and over
	Both Sexes						Male						Female					
All colors - all incomes ^b	82	11	14	37	126	685	86	13	20	47	144	659	78	9	9	28	108	706
Relief	136	12	19	74	306	1228	151	14	30	94	328	1292	122	10	9	56	284	1166
Nonrelief under \$1,000	127	16	24	66	187	757	139	14	30	83	235	787	117	18	18	51	146	734
\$1,000 to \$1,500	53	11	9	21	78	546	55	18	14	27	93	470	51	5	4	15	63	606
\$1,500 to \$2,000	46	9	12	15	63	520	44	11	15	18	76	410	48	7	8	14	49	606
\$2,000 and over	35	4	8	13	32	394	31	5	11	19	28	293	39	2	5	7	36	476
White - all incomes ^b	75	11	13	32	106	628	78	13	19	42	122	591	72	8	8	24	91	658
Relief	121	12	19	67	241	1102	132	13	30	83	258	1131	110	11	9	53	222	1073
Nonrelief under \$1,000	124	15	22	60	174	681	137	15	29	79	224	703	113	14	16	43	132	664
\$1,000 to \$1,500	53	11	9	21	75	543	53	17	15	25	87	457	52	5	4	16	63	611
\$1,500 to \$2,000	46	9	10	16	63	512	44	12	13	18	75	416	48	7	8	14	50	586
\$2,000 and over	36	4	8	16	32	396	32	5	11	20	28	295	40	2	5	11	36	479
Colored - all incomes ^b	146	16	23	76	353	1553	166	14	33	96	397	1704	128	17	16	61	309	1434
Relief	193	12	19	95	593	1878	230	19	29	133	656	2195	162	6	12	67	534	1815
Nonrelief	118	19	25	68	226	1337	129	11	36	80	267	1361	108	27	18	58	184	1318

^a Exclusive of individuals in institutions for the care or rehabilitation of persons with impairment or disease.

^b Includes unknown income.

"dependent population" be defined to include families with annual incomes of less than \$1000, not over 32 percent of the blind are without need of some contribution toward their subsistence. The rates per 100,000 population for the blind by color, sex, age and income status are shown in table 5.

BLINDNESS IN ONE EYE

The discussion in the preceding pages has dealt only with the cases of blindness in both eyes. To those particularly concerned with preventive measures, blindness in one eye is equally important. It may be estimated from Health Survey data that there are nearly 425,000 persons in the general population who have lost or are blind in one eye. The rate was for 325 for each 100,000 of the general population, i.e., one person in every 300 was without the sight of one eye. The excess of males impaired in this manner is even greater than it is in the case of blindness in both eyes; for each 100 females blind in one eye there were 205 males so afflicted. The greater excess is partially explained by the larger proportion of persons blind in one eye as a result of accident causes--particularly occupational injuries--in comparison with those blind in both eyes.

Figure 3 shows the relative importance of the causes of blindness in both eyes and the causes of blindness in one eye. For the latter group, accident replaces disease as the most frequent cause. It was responsible for about one-half (49 percent) of all the cases.

As in the case of blindness in both eyes, cataract heads the list (16 percent) as the principal disease cause of blindness in one of the visual organs.

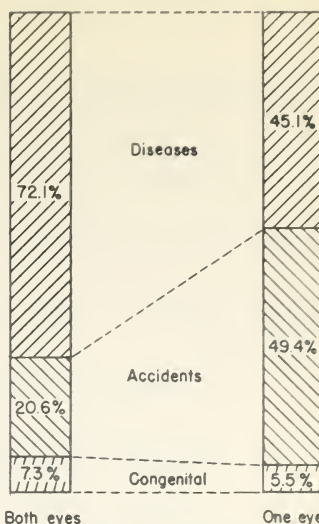
Table 6 shows the percentage distribution of blindness in one eye according to cause and table 7 shows the percentage distribution of blindness in one eye caused by accidents according to the means of injury.

* Based, in each instance, on those for whom income was reported.

TABLE 6. - Percentage Distribution of Blindness, One Eye, according to Cause

8,135 Cases^a Among 2,502,391 Persons in
83 Cities National Health Survey, 1935-36

Cause of blindness	Percentage distribution
All causes	100.0
Diseases	42.4
Known	
Cataract	15.8
Other diseases of the eye	5.4
Infectious and parasitic	5.7
Chronic	3.7
Cerebral hemorrhage	2.7
Ill defined	
Unknown ^b	3.2
Senility	2.9
Other ill defined	3.0
Accidents	51.9
Automobile	2.9
Not automobile	
Occupational	19.1
In the home	18.2
In a public place	7.9
Unspecified place	3.7
Congenital and early infancy	5.7

^a Exclusive of individuals in institutions for the care or rehabilitation of persons with impairment or disease.^b 7.6 percent of cases, reported to be of unknown cause, have been distributed proportionately among diseases, accidents, and congenital causes (the percentages added being 3.2 for disease, 0.2 for automobile accidents, 1.4 for occupational accidents, 1.4 for home accidents, 0.6 for public place accidents, 0.3 for unspecified place accidents, and 0.4 for congenital causes).

BASED ON TABLES 1 & 6

FIG. 3. - Percentage Distribution of Blindness, Both Eyes, and One Eye, according to Cause

Cases Reported to be of Unknown Cause Distributed Proportionately Among the Three Categories Shown

TABLE 7. - Percentage Distribution of Blindness, One Eye, Caused by Accidents according to Means of Injury

3,931 Cases^a Among 2,502,391 Persons in
83 Cities National Health Survey, 1935-36

Means of injury	Percentage distribution
All means of injury	100.0
Fall	7.8
Automobile	5.7
Burn	4.7
Poison	1.1
Firearms, other than wounds of war	6.9
Cutting and piercing instrument	21.3
Machinery, and injury in mine and quarry	4.1
Wounds of war	3.2
Excessive heat	0.2
Transportation other than automobile	1.1
Lightning and electric current	0.1
Animal	1.6
Unspecified	42.3

^a Exclusive of individuals in institutions for the care or rehabilitation of persons with impairment or disease; includes 24 cases reported to be of unknown cause which have been distributed proportionately according to means of injury (see footnote b, table 6).

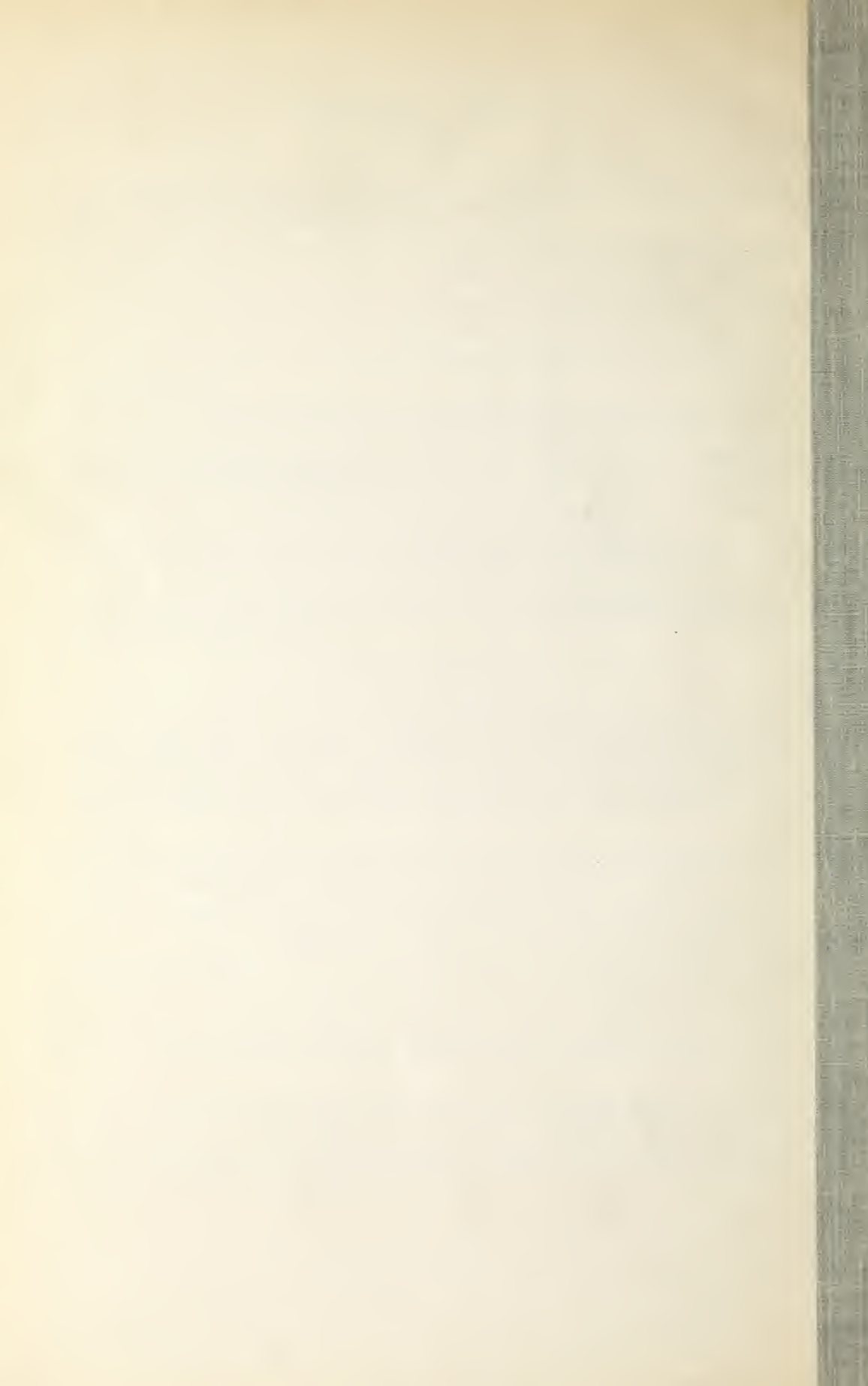
SUMMARY

- A From Health Survey data it is estimated that there are 107,000 blind persons in the general population of the United States.
- B Seventy-two percent of the cases of blindness were caused by disease, 21 percent by accident, and 7 percent by congenital or early infancy causes.
- C The average age of the blind was twice that of the general population. One-fourth of the blind were over 75 years old; three-fifths were over 55.
- D The annual incidence of new cases of blindness was estimated to be 6.6 per 100,000 persons.
- E For each 100 female blind there were approximately 111 blind males.
- F The rate of blindness for colored persons was 146 per 100,000 as compared with 75 for the white population.
- G Eleven percent of the blind were reported as being employed.
- H Sixty-eight percent of the blind (for whom income was reported) were in families with annual incomes of less than \$1,000.
- I In the general population of the United States there were about 425,000 persons blind in one eye only.

NOTES AND REFERENCES

- 1 The schedule carried the special item "Blind", with the following subdivisions: "Both Eyes", "One Eye", "Partial". The entries under the first subdivision no doubt included some persons who were not totally blind, but were "economically blind". However, it is felt that most cases of partial blindness went into the third subdivision, under which 4,903 cases were recorded.
- 2 Harry Best, *Blindness and the Blind in the United States*, The Macmillan Co., 1934. Estimate based on appendix tables B, C, and D, pp. 695-701.
- 3 Bureau of Census, *The Blind and Deaf-Mutes in the United States*, 1930, p. 2.
- 4 *Recent State Surveys of the Blind*, Ralph G. Hurlin, Outlook for the Blind, June 1938, p. 74.
- 5 Harry Best, *op. cit.*, p. 170.
- 6 *Social Security Bulletin*, Social Security Board, September 1938, table 8, p. 44.
- 7 A distinction has been made between those cases of blindness due to a single exposure of intense degree and those due to exposure over a period of time. In table 1 the former are in the accident group, while the latter are included under "ill-defined diseases" because they are more closely related to disease than to accident.





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